

## CLAIMS

1-90. (canceled)

91. (new) Apparatus for generating a predistorted signal from an input signal to reduce distortion in an output signal generated by signal handling equipment based on the predistorted signal, the apparatus comprising:

an extractor adapted to generate an extracted signal from the input signal;  
a generator adapted to generate a distortion signal based on the extracted signal, wherein the distortion signal comprises:  
a second-order distortion component based on a second-order signal generated from the extracted signal; and  
a fourth-order distortion component based on a fourth-order signal generated from the extracted signal; and  
a modulator adapted to modulate the input signal based on the distortion signal to generate the predistorted signal.

92. (new) The invention of claim 91, wherein the distortion signal further comprises a sixth-order distortion component based on a sixth-order signal generated from the extracted signal.

93. (new) The invention of claim 91, wherein the distortion signal does not comprise any odd-order distortion components based on any odd-order signal generated from the extracted signal.

94. (new) The invention of claim 91, wherein the generator is a digital generator adapted to digitally generate the distortion signal.

95. (new) The invention of claim 91, wherein:  
the distortion signal comprises an in-phase component and a quadrature component;  
the in-phase signal comprises:  
a first in-phase component based on the second-order signal; and  
a second in-phase component based on the fourth-order signal; and  
the quadrature signal comprises:  
a first quadrature component based on the second-order signal; and  
a second quadrature component based on the fourth-order signal.

96. (new) The invention of claim 95, wherein:  
the in-phase signal further comprises a third in-phase component based on a sixth-order signal generated from the extracted signal; and  
the quadrature signal further comprises a third quadrature component based on a sixth-order signal generated from the extracted signal.

97. (new) The invention of claim 91, wherein the modulator is adapted to:  
divide the input signal into an in-phase component and a quadrature component;  
multiply one of the in-phase and quadrature components by the distortion signal to generate a first product;  
multiply the other component by only a first DC distortion component to generate a second product; and  
combine the first and second products to generate the predistorted signal.

1           98.     (new) The invention of claim 97, wherein the distortion signal further comprises a  
2 second DC distortion component.

1           99.     (new) The invention of claim 91, further comprising automatic gain control (AGC)  
2 circuitry adapted to condition the extracted signal such that an envelope of the conditioned signal  
3 maintains a substantially constant amplitude.

1           100.    (new) The invention of claim 91, further comprising a controller adapted to control  
2 operations of the generator.

1           101.    (new) The invention of claim 100, further comprising one or more mixers, each mixer  
2 adapted to multiply a portion of the extracted signal by a portion of the output signal to generate an input  
3 signal to the controller.

1           102.    (new) The invention of claim 101, wherein the one or more mixers comprise:  
2 a first mixer adapted to multiply an in-phase portion of the extracted signal by a first portion of  
3 the output signal to generate an in-phase input signal to the controller; and  
4 a second mixer adapted to multiply a quadrature portion of the extracted signal by a second  
5 portion of the output signal to generate a quadrature input signal to the controller.

1           103.    (new) The invention of claim 100, wherein the controller comprises two or more control  
2 paths, each control path adapted to generate a different-order control signal used by the generator to  
3 generate a different-order distortion component in the distortion signal.

1           104.    (new) The invention of claim 103, wherein each control path comprises:  
2 a mixer adapted to multiply a portion of the output signal by a different-order signal generated  
3 from the extracted signal to generate a product; and  
4 an integrator adapted to integrate the product to generate a corresponding control signal.

1           105.    (new) The invention of claim 103, wherein:  
2 the controller comprises a transformer adapted to generate different-frequency components of the  
3 output signal; and  
4 each control path comprises:  
5 a detector adapted to detect a power level of a different-frequency output component;  
6 and  
7 an integrator adapted to integrate the detected power level to generate a corresponding  
8 control signal.

1           106.    (new) The invention of claim 103, wherein each control path comprises:  
2 a band-pass filter adapted to isolate a different-frequency component of the output signal;  
3 a detector adapted to detect a power level of the different-frequency output component; and  
4 an integrator adapted to integrate the detected power level to generate a corresponding control  
5 signal.

1           107.    (new) The invention of claim 91, wherein the input signal is an analog RF signal.

1           108.    (new) The invention of claim 91, wherein the input signal comprises baseband in-phase  
2 and quadrature components.

1           109. (new) The invention of claim 91, wherein:  
2           the modulator comprises a phase shifter, an amplitude modulator, and a coupler;  
3           the amplitude modulator is adapted to modulate the amplitude of the input signal based on the  
4 distortion signal; and  
5           the coupler is adapted to combine the outputs from the phase shifter and the amplitude modulator  
6 to generate the predistorted signal.

1           110. (new) The invention of claim 109, wherein:  
2           the phase shifter is adapted to shift the phase of a first portion of the input signal; and  
3           the amplitude modulator is adapted to modulate the amplitude of a second portion of the input  
4 signal, different from the first portion.

1           111. (new) The invention of claim 109, further comprising a second phase shifter adapted to  
2 shift phase of one of a portion of the extracted signal and a portion of the output signal, wherein the  
3 portions are combined to generate a signal used to control operations of the generator.

1           112. (new) The invention of claim 91, wherein the signal handling equipment comprises an  
2 amplifier.

1           113. (new) A method for generating a predistorted signal from an input signal to reduce  
2 distortion in an output signal generated by signal handling equipment based on the predistorted signal,  
3 the method comprising:  
4           generating an extracted signal from the input signal;  
5           generating a distortion signal based on the extracted signal, wherein the distortion signal  
6 comprises:  
7               a second-order distortion component based on a second-order signal generated from the  
8 extracted signal; and  
9               a fourth-order distortion component based on a fourth-order signal generated from the  
10 extracted signal; and  
11           modulating the input signal based on the distortion signal to generate the predistorted signal.

1           114. (new) The invention of claim 113, wherein the distortion signal further comprises a  
2 sixth-order distortion component based on a sixth-order signal generated from the extracted signal.

1           115. (new) The invention of claim 113, wherein the distortion signal does not comprise any  
2 odd-order distortion components based on any odd-order signal generated from the extracted signal.

1           116. (new) The invention of claim 113, wherein the distortion signal is generated digitally.

1           117. (new) The invention of claim 113, wherein:  
2 the distortion signal comprises an in-phase component and a quadrature component;  
3 the in-phase signal comprises:  
4           a first in-phase component based on the second-order signal; and  
5           a second in-phase component based on the fourth-order signal; and  
6 the quadrature signal comprises:  
7           a first quadrature component based on the second-order signal; and  
8           a second quadrature component based on the fourth-order signal.

1 118. (new) The invention of claim 117, wherein:  
2 the in-phase signal further comprises a third in-phase component based on a sixth-order signal  
3 generated from the extracted signal; and  
4 the quadrature signal further comprises a third quadrature component based on a sixth-order  
5 signal generated from the extracted signal.

1 119. (new) The invention of claim 113, wherein the modulating comprises:  
2 dividing the input signal into an in-phase component and a quadrature component;  
3 multiplying one of the in-phase and quadrature components by the distortion signal to generate a  
4 first product;  
5 multiplying the other component by only a first DC distortion component to generate a second  
6 product; and  
7 combining the first and second products to generate the predistorted signal.

1 120. (new) The invention of claim 119, wherein the distortion signal further comprises a  
2 second DC distortion component.

1 121. (new) The invention of claim 113, further comprising conditioning the extracted signal  
2 such that an envelope of the conditioned signal maintains a substantially constant amplitude.

1 122. (new) The invention of claim 113, further comprising controlling operations of the  
2 generating.

1 123. (new) The invention of claim 122, further comprising multiplying a portion of the  
2 extracted signal by a portion of the output signal to generate an input signal for the controlling.

1 124. (new) The invention of claim 123, comprising:  
2 multiplying an in-phase portion of the extracted signal by a first portion of the output signal to  
3 generate an in-phase input signal for the controlling; and  
4 multiplying a quadrature portion of the extracted signal by a second portion of the output signal  
5 to generate a quadrature input signal for the controlling.

1 125. (new) The invention of claim 122, comprising, for two or more control paths, generating  
2 a different-order control signal used for the generating to generate a different-order distortion component  
3 in the distortion signal.

1 126. (new) The invention of claim 125, comprising, for each control path:  
2 multiplying a portion of the output signal by a different-order signal generated from the extracted  
3 signal to generate a product; and  
4 integrating the product to generate a corresponding control signal.

1 127. (new) The invention of claim 125, wherein:  
2 the controlling comprises generating different-frequency components of the output signal; and  
3 comprising, for each control path:  
4 detecting a power level of a different-frequency output component; and  
5 integrating the detected power level to generate a corresponding control signal.

1 128. (new) The invention of claim 125, comprising, for each control path:  
2 isolating a different-frequency component of the output signal;  
3 detecting a power level of the different-frequency output component; and

4 integrating the detected power level to generate a corresponding control signal.

1 129. (new) The invention of claim 113, wherein the input signal is an analog RF signal.

1 130. (new) The invention of claim 113, wherein the input signal comprises baseband in-phase  
2 and quadrature components.

1 131. (new) The invention of claim 113, wherein the modulating comprises:  
2 shifting the phase of the input signal;  
3 modulating the amplitude of the input signal based on the distortion signal; and  
4 combining the outputs from the phase shifting and the amplitude modulating to generate the  
5 predistorted signal.

1 132. (new) The invention of claim 131, wherein:  
2 the phase shifter is adapted to shift the phase of a first portion of the input signal; and  
3 the amplitude modulator is adapted to modulate the amplitude of a second portion of the input  
4 signal, different from the first portion.

1 133. (new) The invention of claim 131, further comprising shifting the phase of one of a  
2 portion of the extracted signal and a portion of the output signal, wherein the portions are combined to  
3 generate a signal used to control operations of the generating.

1 134. (new) The invention of claim 113, wherein the signal handling equipment comprises an  
2 amplifier.

1 135. (new) Apparatus for generating a predistorted signal from an input signal to reduce  
2 distortion in an output signal generated by signal handling equipment based on the predistorted signal,  
3 the apparatus comprising:  
4 means for generating an extracted signal from the input signal;  
5 means for generating a distortion signal based on the extracted signal, wherein the distortion  
6 signal comprises:  
7 a second-order distortion component based on a second-order signal generated from the  
8 extracted signal; and  
9 a fourth-order distortion component based on a fourth-order signal generated from the  
10 extracted signal; and  
11 means for modulating the input signal based on the distortion signal to generate the predistorted  
12 signal.

1 136. (new) Apparatus for generating a predistorted signal from an input signal to reduce  
2 distortion in an output signal generated by signal handling equipment based on the predistorted signal,  
3 the apparatus comprising:  
4 an extractor adapted to generate an extracted signals from the input signal;  
5 automatic gain control (AGC) circuitry adapted to condition the extracted signal so that the  
6 conditioned signal envelope maintains a substantially constant amplitude;  
7 a generator adapted to generate a distortion signal based on the conditioned signal; and  
8 a modulator adapted to modulate the input signal based on the distortion signal to generate the  
9 predistorted signal.

1           137.   (new) A method for generating a predistorted signal from an input signal to reduce  
2 distortion in an output signal generated by signal handling equipment based on the predistorted signal,  
3 the method comprising:

4           generating an extracted signals from the input signal;  
5           conditioning the extracted signal so that the conditioned signal envelope maintains a  
6 substantially constant amplitude;  
7           generating a distortion signal based on the conditioned signal; and  
8           modulating the input signal based on the distortion signal to generate the predistorted signal.

1           138.   (new) Apparatus for generating a predistorted signal from an input signal to reduce  
2 distortion in an output signal generated by signal handling equipment based on the predistorted signal,  
3 the apparatus comprising:

4           means for generating an extracted signal from the input signal;  
5           means for conditioning the extracted signal so that the conditioned signal envelope maintains a  
6 substantially constant amplitude;  
7           means for generating a distortion signal based on the conditioned signal; and  
8           means for modulating the input signal based on the distortion signal to generate the predistorted  
9 signal.

1           139.   (new) The invention of claim 91, wherein the generator is adapted to generate at least  
2 one of the distortion components using a polynomial-based technique or a look-up table-based technique.

1           140.   (new) The invention of claim 113, wherein at least one of the distortion components is  
2 generated using a polynomial-based technique or a look-up table-based technique.

1           141.   (new) The invention of claim 91, wherein:  
2           the generator is adapted to generate first and second distortion signals based on the extracted  
3 signal; and  
4           the modulator is adapted to:  
5           divide the input signal into an in-phase component and a quadrature component;  
6           multiply the in-phase component by the first distortion signal to generate a first product;  
7           multiply the quadrature component by the second distortion signal to generate a second  
8 product; and  
9           combine the first and second products to generate the predistorted signal.

1           142.   (new) The invention of claim 113, wherein:  
2           first and second distortion signals are generated based on the extracted signal; and  
3           the input signal is modulated by:  
4           dividing the input signal into an in-phase component and a quadrature component;  
5           multiplying the in-phase component by the first distortion signal to generate a first  
6 product;  
7           multiplying the quadrature component by the second distortion signal to generate a  
8 second product; and  
9           combining the first and second products to generate the predistorted signal.